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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
NGUYEN, TU MINH	
ART UNIT	PAPER NUMBER
3748	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/065,624	JOBSON ET AL.	
	Examiner	Art Unit	
	TU M. NGUYEN	3748	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 December 2010*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *36-59* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *36-39,46-49 and 56-59* is/are rejected.

7)☒ Claim(s) *40-45 and 50-55* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 October 2007* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *20101005*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. An Applicant's Amendment filed on December 16, 2010 has been entered. Claims 36 and 46 have been amended; and claims 56-59 have been added. Overall, claims 36-59 are pending in this application.

Drawings

2. The formal drawing of Figure 6 filed on October 9, 2007 has been approved for entry.

Claim Objections

3. Claims 56 and 58 are objected to because on line 1 of each claim, "device" should read --method--. Appropriate correction is required.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office Action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 36, 38, 39, 46, 48, 49, and 56-59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aine (U.S. Patent 3,903,694) in view of Henis et al. (U.S. Patent 4,230,463) and Kato et al. (U.S. Patent 5,953,907).

Re claims 36 and 46, as shown in Figures 1-2, Aine discloses a device and a method for reducing an amount of oxide of nitrogen (NOx compound) (NO_2) in an exhaust gas flow of a combustion engine (2), the method comprising steps of:

- feeding the exhaust gas flow from the engine to a separation unit (6);

- separating in the separation unit a gas component (NO_2) from the exhaust gas flow, the gas component being constituted by an oxide of nitrogen (NOx compound) or water present in the exhaust gas flow, in a wall structure (12) comprising material (lines 43-63 of column 4) which provides a selective passage of the gas component before other gas components (nitrogen, oxygen, CO) in the exhaust gas flow; and

- returning the separated gas component to an inlet (3) of the engine via a conduit, the gas component including fresh air as a carrier gas for the gas component (as clearly shown in Figure 1).

Aine, however, fails to specifically disclose that the engine is adapted for operation by a lean air/fuel mixture; that the wall structure is a porous material which provides a selective passage of the gas component through the wall structure based on molecular size and molecular form; and that the method further comprises a step of detecting an amount of the oxide of nitrogen in the exhaust gas flow for controlling the amount of oxide of nitrogen (NOx compound) present in the exhaust gas flow.

Aine discloses the claimed invention except for applying the invention to a lean air-fuel ratio burning engine. It would have been obvious to one having ordinary skill in the art at the time the invention was made to apply the invention of Aine to a lean burning type engine, since the recitation of such amounts to an intended use statement. Note that all internal combustion engines that utilize a hydrocarbon compound as a fuel and air as a source of oxygen generate exhaust gases containing harmful emissions of HC, NOx, soot, CO, etc, that require purification before the gases can be released to the atmosphere; and the mere selection of the purification system of Aine for use in a lean air-fuel ratio burning engine would be well within the level of ordinary skill in the art.

As indicated in the Abstract, lines 9-30 of column 7, and lines 19-65 of column 13, Henis et al. teach multi-component membranes for gas separations by permeation, wherein the membranes comprise a coating in occluding contact with a porous separation membrane such that the membranes, exhibiting less resistance to permeate gas flow for the at least one gas component than for the remaining gas components in a gaseous mixture, provide a selective passage of said at least one gas component through the wall structure based on molecular size and molecular form. It would have been obvious to one having ordinary skill in the art at the time of the invention was made, to have utilized the multi-component membranes taught by Henis et al. in the separation unit in Aine, since the use thereof would have been routinely practiced by those with ordinary skill in the art to effectively separate a gas component from a gaseous mixture.

As shown in Figure 1, Kato et al. disclose a method of controlling an engine exhaust gas system, wherein the system comprising a NOx catalyst (30) and a NOx sensor (40) located

downstream of the catalyst. As indicated on lines 46-61 of column 3, Kato et al. teach that it is conventional in the art to utilize the NOx sensor to detect an amount of NOx in an exhaust gas stream, wherein when the detected amount reaches a predetermined value, a fuel injection quantity control section controls a fuel injection into the engine so that the air-fuel ratio of a mixture supplied to the engine is at a stoichiometric or rich condition for the efficient reduction of NOx at the catalyst in order to reduce an amount of NOx present in the exhaust gas stream. It would have been obvious to one having ordinary skill in the art at the time of the invention was made, to have utilized the NOx sensor taught by Kato et al. to control a flow of air into the separation unit in Aine, since the use thereof would have been routinely practiced by those with ordinary skill in the art to remove harmful NOx emissions in an exhaust gas stream.

Re claims 38 and 48, in the modified method and device of Aine, as taught by Kato et al., the method further includes an additional step of supplying a reducing agent depending on the detected amount of the oxide of nitrogen (in Kato et al., a rich air-fuel mixture supplied to the engine results in excess unburned HC and CO in the exhaust gas).

Re claims 39 and 49, in the modified method and device of Aine, as taught by Kato et al. (lines 9-23 of column 5), the method further comprises a step of diagnosing a function regarding reduction of the oxide of nitrogen.

Re claims 56 and 57, with the multi-component membranes taught by Henis et al., the gas component in the modified method and device of Aine is water steam.

Re claims 58 and 59, in the modified method and device of Aine, the gas component is oxide of nitrogen (NOx compound) (NO_2).

6. Claims 37 and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aine in view of Henis et al. and Kato et al. as applied to claims 36 and 46, respectively, above, and further in view of Casey (U.S. Patent 5,661,973).

The modified device and method of Aine disclose the invention as cited above, however, fail to disclose that the engine is provided in connection with a turbo-aggregate with an exhaust gas turbine and a compressor for compression of air which has been fed into the engine, characterized in that an outlet conduit of the separation unit is connected to a point upstream of the compressor.

As shown in Figure 1, Casey discloses a fuel saving device for an internal combustion engine, comprising a separation unit (10) having a recovery chamber (22) for trapping residual fuel components in an exhaust gas stream and returning the components to the engine via an outlet conduit (29). As indicated on lines 39-50 of column 3, Casey teaches that it is conventional in the art to return the residual fuel components to a turbo-aggregate with an exhaust gas turbine and a compressor for compression of air that has been fed into the engine, wherein the outlet conduit of the separation unit is connected to a point upstream of the compressor. It would have been obvious to one having ordinary skill in the art at the time of the invention was made, to have utilized the teaching by Casey in the modified device and method of Aine, since the use thereof would have been routinely practiced by those with ordinary skill in the art to effectively remove harmful emissions in the exhaust gas stream.

Allowable Subject Matter

7. Claims 40-45 and 50-55 are objected to as being dependent upon a rejected base claim, but would be allowable if amend to overcome a claim objection outlined above and rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

8. Applicant's arguments with respect to the references applied in the previous Office Action have been fully considered but they are not persuasive.

In response to applicant's argument that Henis et al. fail to teach or suggest a membrane which provides a selective passage of a gas component through the wall structure due to molecular size and molecular form of the gas component (pages 8-9 of Applicant's Amendment), the examiner respectfully disagrees.

The text on lines 9-30 of column 7 in Henis et al. reads as follows:

"In accordance with this invention, the multicomponent membranes for gas separation comprise a porous separation membrane having feed and exit surfaces and a coating material in contact with the porous separation membrane. The porous separation membrane has essentially the same composition, or material, throughout its structure, i.e., the porous separation membrane is substantially chemically homogenous. The material of the porous separation membrane exhibits selective permeation for at least one gas of a gaseous mixture over that of at least one remaining gas of the mixture, and hence the porous separation membrane is defined as a "separation" membrane. By describing the separation membrane as "porous" it is meant that the membrane has continuous channels for gas flow, i.e., pores, which communicate between the feed surface and exit surface. These continuous channels, if sufficiently large in number and in

cross-section, can permit essentially all of a gaseous mixture to flow through the porous separation membrane with little, if any, separation due to interaction with the material of the *porous separation membrane."* (emphasis added by examiner)

Based on the above disclosure, Henis et al. disclose that their multi-component porous membrane comprises a plurality of pores which are a number of continuous channels from a feed surface to an exit surface of the membrane for gas flow. They further disclose that these channels are such that (i.e., cross-section of a channel is sized so that) the porous membrane exhibits selective permeation of at least one gaseous component over that of at least one remaining gas component of the mixture. Thus, Henis et al. clearly disclose or suggest a membrane which provides a selective passage of a gas component through the wall structure due to molecular size and molecular form of the gas component.

Conclusion

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Prior Art

10. The IDS (PTO-1449) filed on October 5, 2010 has been considered. An initialized copy is attached hereto.

Communication

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Tu Nguyen whose telephone number is (571) 272-4862.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Thomas E. Denion, can be reached on (571) 272-4859. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Tu M. Nguyen/
Tu M. Nguyen
Primary Examiner
Art Unit 3748

TMN
March 13, 2011